

DERWENT-ACC-NO: 1991-337353

DERWENT-WEEK: 199146

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TITLE: Curvature enhanced jet cooling for chips with heat sinks
- using piston to impinge liquid jet on curved heat sinks
attached to chips, having greater surface area

PATENT-ASSIGNEE: ANONYMOUS[ANON]

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
RD 330045 A	October 10, 1991	N/A	000	N/A

INT-CL (IPC): H01L000/01

ABSTRACTED-PUB-NO: RD 330045A

BASIC-ABSTRACT:

A silicon chip (8) or arrays of chips are mounted on a substrate (9). Attached to each chip is a curved heat sink (7) which may be fabricated of molybdenum, silicon carbide or silicon to accommodate the thermal expansion characteristics of the silicon chip. The centre of the heat sink has a hemispherical depression into which projects a piston (4) with a centrally located flow passage (3). The piston is contained in a circular well (12) within the module housing (10) and is maintained in contact with the heat sink by the force of a spring (5). A circular hole (2) in the end of the piston well (12) allows dielectric coolant to flow into the well from the main plenum (1) which can be designed to supply coolant to many wells.

The central flow passage (3) in the piston is sufficiently large, compared to the annulus (13) between the surface of the piston and the surrounding walls of the well, that the coolant will flow preferentially through the passage and provide a jet impinging upon the hemispherical surface of the heat sink (14). Spacing bumps (6) are provided on the surface of the piston to provide a flow channel to allow coolant to flow over the hemispherical heat sink surface (14) and then exhaust. Heat transfer may be by convection without phase change, or at higher heat flux levels boiling may occur.

USE/ADVANTAGE - Cooling high power integrated circuit chips utilising curved heat sink and impinging liquid jet delivered through piston. Hemispherical surface provides greater heat transfer area. Curved flow passage formed by space between heat sink (7) and piston (4) results in an artificial "g" force which promotes departure of bubbles from surface and delays onset of film boiling.

CHOSEN-DRAWING: Dwg.1/1

TITLE-TERMS: CURVE ENHANCE JET COOLING CHIP HEAT SINK PISTON IMPINGE LIQUID JET
CURVE HEAT SINK ATTACH CHIP GREATER SURFACE AREA

DERWENT-CLASS: U11 V04

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